

Remarks

Reconsideration and allowance of the subject patent application are respectfully requested.

Claims 1, 5-7, 10, 17, 18, 21-26, 28 and 31-38 were rejected under 35 U.S.C. Section 103(a) as allegedly being "obvious" over Maitani et al. (U.S. Patent No. 6,656,828) in view of Ianuzzi et al. (U.S. Patent No. 4,176,443). While not acquiescing in this rejection for reasons previously stated, claims 1, 17, 25 and 35 have been amended (e.g., to incorporate the subject matter of now-canceled claims 36-38) and the discussion below makes reference to the amended claims.

Claim 1 describes a metal layer comprising a nickel layer and a gold layer on a main conductor layer, the metal layer completely covering a bottom surface, but not side surfaces, of an opening section formed in an insulating layer. The nickel layer is made of Ni or a metal having Ni as its main component and is formed, by electroless plating, only in the opening section. Claim 17 describes a metal layer comprising a barrier layer and a top metal layer formed in an opening in an insulating layer, the metal layer completely covering the upper surface portion of a wiring layer exposed by the opening. The barrier layer is formed, by electroless plating, only in the opening. Claim 25 describes a metal layer comprising a barrier layer and a top layer that completely covers the upper surface of a wiring layer exposed by an opening in an insulating layer. The barrier metal layer is formed, by electroless plating, only in the opening. Claim 35 describes a metal layer which comprises a barrier metal layer and a top layer and which has its lateral dimensions defined by an opening in an insulating layer. The metal layer completely covers an upper surface portion of a wiring layer exposed by the opening, but does not completely cover side surfaces of the opening. The barrier metal layer is formed, by electroless plating, only in the opening.

For the reasons set forth below, Applicants traverse the rejection of these claims, and the claims that depend therefrom, as allegedly being obvious over the proposed combination of Maitani et al. and Ianuzzi et al.

Figure 5 of Maitani et al. discloses forming a gold layer 15 in an opening formed in polyimide layer 3. As acknowledged in the office action, there is no disclosure or suggestion that, among other things, Ni layer 14 of Maitani et al. be formed only in the opening. See page 3 of 1/25/06 Office Action ("Fig. 5 of Maitani shows most aspect (sic) of the instant invention except a Ni layer (barrier layer) formed only in the opening."). The office action relies upon Ianuzzi et al. to cure this deficiency.

Ianuzzi et al. discloses terminal leads 12 that contact insular zones of a wafer region via a base layer 2 of aluminum, a first intermediate layer 3 of chromium or titanium, a second intermediate layer 4 of nickel and an outer layer 5 of gold or platinum. See Figure. Ianuzzi et al. contains two references to an Ni layer. At col. 2, lines 35-36, Ianuzzi et al. mentions "...a second intermediate layer 4 of nickel with a minimum thickness of 4000 Å ..." Col. 3, lines 20-27 of Ianuzzi et al. describes:

This operation is followed by successive vapor depositions over the entire front surface, under vacuum at temperatures between 100° and 150° C, of Cr and Ti to form the layers 3, of Ni to form the layers 4, and of Au or Pd to form the layers 5. The remaining parts of the photoresist layer 16, indicated by phantom lines, can then be stripped off together with the portions of layers 3, 4, and 5 deposited thereon.

Consequently, the Ni layer 4 (second intermediate layer) of Ianuzzi et al. is formed by vapor deposition, not electroless plating. As such, Ianuzzi et al. clearly does not contain the technical idea that the Ni layer 4 is formed by electroless plating as specified, for example, in claims 1, 17, 25 and 35.

The office action contends that how the Ni layer is formed (whether or not the Ni layer is formed by electroless plating) is not given patentable weight.

However, the configuration set forth in the claims (e.g., a metal layer which (i) completely covers a lower surface of an opening section on a main conductor layer, but not a sidewall of the opening section and (ii) is provided only between the main conductor layer and a protrudent electrode made of Sn or a metal layer having Sn as its main component (that is, the Ni layer is formed only in the opening section)) can only be formed by a method adopting electroless plating. Consequently, even if the methods disclosed in the applied references are

combined, the metal layer cannot be formed only in the opening section. Thus, "how the Ni layer is formed" is significant in view of the configuration of a semiconductor device.

Moreover, generally speaking and as discussed in prior responses, Ianuzzi et al. is quite different than Maitani et al. in that Ianuzzi et al. does not involve, among other things, an arrangement in which a main conductor layer is connected to a bonding pad, etc. Thus, the motivation for modifying Maitani et al. based on Ianuzzi et al. appears to derive from a desire to "piece together" the claimed features rather than any teaching or suggestion that is apparent from the documents themselves.

Further, because Ianuzzi et al. deals with "stacks" formed on a wafer surface, Applicants submit that Ianuzzi et al. could not provide (absent impermissible hindsight) a teaching to modify the physical arrangement of layer 14 of Maitani et al. (which is formed on a Cu layer) so that layer 14 is confined to be only in the contact hole. In other words, Ianuzzi et al. has no layer which corresponds to layer 14 of Maitani et al. and Ianuzzi et al. could not provide any basis for modifying such a layer.

Still further, because of the differences between Ianuzzi et al. and Maitani et al., Applicants submit that one of ordinary skill in the art would not have been motivated to replace the structure in the opening in Maitani et al. with the stack structure in Ianuzzi et al. This combination would result in two Ni layers and, as noted in the prior response, Applicants see no reason why one of ordinary skill in the art would have sought to provide two different Ni layers. In this regard, the office action expressly notes that "the combined teachings of Maitani and Ianuzzi would have a Ni layer only in the opening without providing another Ni layer." Thus, Applicants understand the office action to be using Ianuzzi et al. as a teaching to not form layer 14 of Maitani et al. However, as mentioned above, Applicants do not believe Ianuzzi et al. can be properly relied upon to provide a basis for modifying (or not providing) layer 14.

For at least these reasons, Applicants submit that the proposed combination of Maitani et al. and Ianuzzi et al. would not have resulted in the subject matter of the rejected claims.

Claim 19 was rejected under 35 U.S.C. Section 103(a) as allegedly being "obvious" over the proposed Maitani et al.-Ianuzzi et al. combination, in further view of Greer (U.S. Patent No. 6,451,681). However, as previously discussed, this purported "conductive layer" of Greer is,

ISHIO et al.

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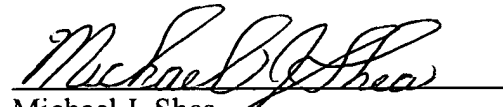
among other things, not connected to an electrode pad formed on a semiconductor substrate as claimed. As such, Greer would not have provided any teaching or suggestion to modify the conductive layer of the combined Maitani et al.-Ianuzzi et al. combination as proposed.

Applicants submit that the pending claims are in condition for allowance, and action to that end is earnestly solicited.

If any issues remain to be resolved, the Examiner is urged to contact the attorney for Applicants at the telephone number listed below.

Respectfully submitted,

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A handwritten signature in cursive script, appearing to read "Michael J. Shea", written over a horizontal line.

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